CHAPTER 4

# Maintaining the LightStream 1010 ATM Switch

This chapter describes maintenance procedures for adding and replacing internal system components such as the system fan assembly and power supplies for the LightStream 1010 ATM switch.

Your switch is configured as specified in your order and is ready for installation and startup when it leaves the factory. As your communication requirements change, you can upgrade your system, add components, or change the initial configuration. Software and component upgrades require specific documents and other frequently updated information; therefore, only basic replacement guidelines are included in this publication. Detailed, up-to-date instructions are shipped with the replacement part upgrade kits.

There are two kinds of replaceable system components: those that support hot swapping and those that require the system power to be shut down before they are replaced. Redundant power supplies, carrier modules (CMs), port adapter modules (PAMs), and the fan assembly are hot swappable.

This chapter contains the following sections:

- Removing and Installing the ASP, CMs, and PAMs
- Removing and Installing Power Supplies
- Replacing the Chassis Fan Assembly

# Removing and Installing the ASP, CMs, and PAMs

All CMs and PAMs support hot swapping, which allows you to remove, install, and rearrange the CMs or PAMs without turning off the system power. When the system detects that a CM or PAM has been installed or removed, it automatically runs diagnostic and discovery routines, acknowledges the presence or absence of the PAM, and resumes system operation without any operator intervention.

**Caution** All CMs or PAMs support hot swapping; however, the ATM switch processor (ASP) is a required system component. Removing an ASP while the system is operating causes the system to shut down and can damage the processor.

For detailed ASP, CM, and PAM installation, replacement, and upgrade instructions, see the *LightStream 1010 ATM Switch ASP Installation Guide* and *LightStream 1010 ATM Switch PAM Installation Guide* publications.

# Removing and Installing Power Supplies

The switch is configured to your order and is ready for installation and startup when it leaves the factory. As your communication requirements change, you might want to upgrade your system and add or replace a power supply. This section includes the following power supply information:

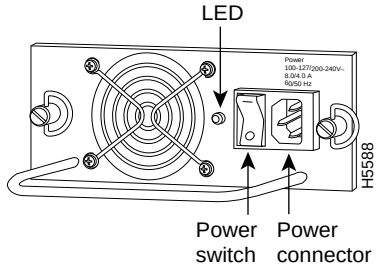
- Power Supply LEDs
- Overvoltage and Overtemperature Protection
- Removing and Installing AC Power Supplies
- Removing and Installing DC Power Supplies

## Power Supply LEDs

The green LED (see Figure 4-1) indicates the status of the power supply and internal DC voltages. The LED stays on when the power supply is on and receiving source power, providing +5, +12, and +24 VDC to internal components, and shows that all internal voltages are within tolerance.

If the source power or any of the internal DC voltages exceed allowable tolerances, the LED goes off and the system environmental monitor messages indicate the out-of-tolerance line. Because the system requires all three output voltages for operation, the system malfunctions or shuts down if any of the internal DC voltages reach an out-of-tolerance state.

**Figure 4-1 Power Supply LED (AC Power Supply Shown)**




## ATM Switch Processor Power Supply LEDs

On the ATM switch processor front panel, the PS0 LED goes on when the power supply in the left bay, labeled PS0, is installed and supplying power to the system. The PS1 LED goes on when the power supply in the right bay, labeled PS1, is installed and supplying power to the system. Both the LEDs should be on in systems with redundant power. The ATM switch processor LEDs are shown in Figure 4-2 and are described in Table 4-1.

**Figure 4-2 ATM Switch Processor Power Supply LEDs**

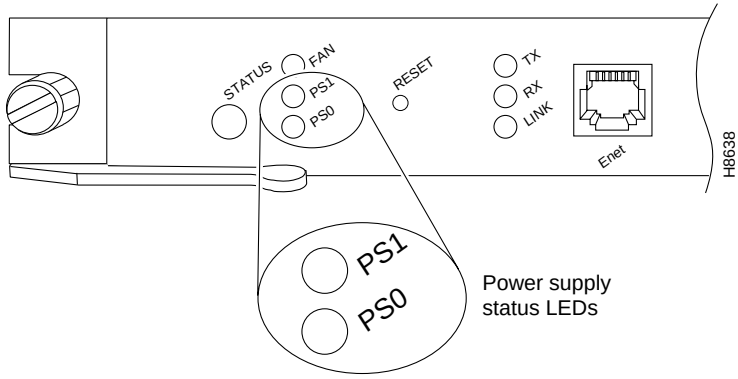



**Table 4-1 ATM Switch Processor Power Supply LEDs**

| LED | Description |
|---|---|
| PS0 | If the left bay power supply is operational, the PS0 LED is green.<br>If the left bay power supply is turned off or is not operational, the PS0 LED is red.<br>If the left bay power supply is not installed, the PS0 LED is off. |
| PS1 | If the right bay power supply is operational, the PS1 LED is green.<br>If the right bay power supply is turned off or not operational, the PS1 LED is red.<br>If the right bay power supply is not installed, the PS1 LED is off. |

# Overvoltage and Overtemperature Protection

The power supply monitors its own temperature and internal voltages. If the supply detects an overvoltage or overtemperature condition, it shuts down to avoid damage to the power supply or other system components.

**Note** If the power supply shuts down, wait several minutes for the supply to cool, then turn the power switch off (0), then on (–). If the power supply shuts down again, remove and replace it.

# Removing and Installing AC Power Supplies

The 376W power supplies (AC-input) support redundant hot swapping. When two power supplies are installed, you can remove or install one of the supplies without affecting system operation. When power is removed from one supply, the redundant power feature causes the second supply to ramp up to full power and maintain uninterrupted system operation. In systems with dual power supplies, connect each power supply to separate input lines so that, in case of a line failure, the second source is available and can maintain maximum overcurrent protection for each power connection.

A modular power cord should connect each AC power supply to a separate site power source.

**Caution** Use both hands to remove and install power supplies.

**Caution** To avoid problems or damage to the switch, *do not* mix DC-input power supplies with AC-input power supplies in individual switches.

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**Note** Each AC-input power supply weighs 11 pounds (4.98 kilograms).

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**Caution** Keep hands and fingers out of the power supply bays. Voltage is present on the switch backplane when the system is operating.

## Tools Required

You need the following tools to remove and install a power supply:

- A 1/4-inch flat-blade screwdriver to remove and install filler plates and to loosen or tighten the captive installation screws on the AC power supply
- Filler plates to install over empty power supply bays to protect the connectors from contamination

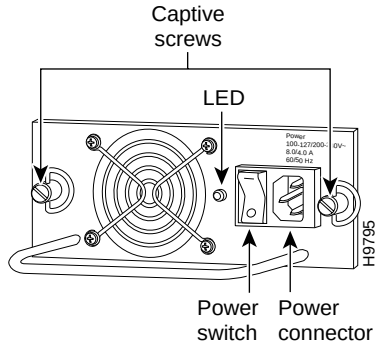
## Removing AC Power Supplies

Take the following steps to remove an AC power supply:

**Step 1** Turn OFF the power switch on the power supply you are removing. (See Figure 4-3.)

**Caution** Failure to turn off the AC power supply could result in equipment damage.

**Figure 4-3 AC Power Supply Switch, AC Connection, and Captive Screws**




**Step 2** Disconnect the AC power cord from the power source.

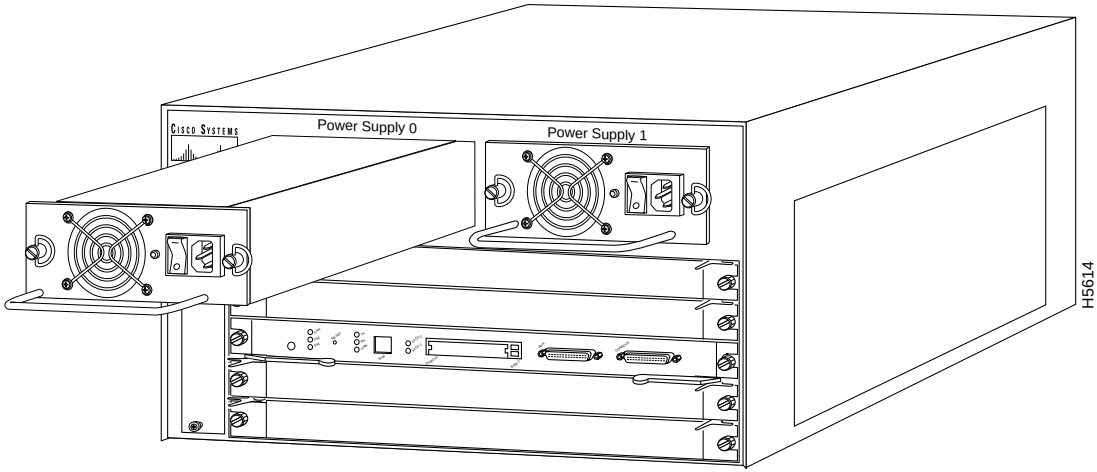
**Step 3** Remove the AC power cord from the power inlet.

**Step 4** Loosen the captive installation screws on the sides of the supply with a screwdriver. (See Figure 4-3.)

**Caution** Alternate tightening of the captive installation screws every one or two turns to avoid skewing the power supply.

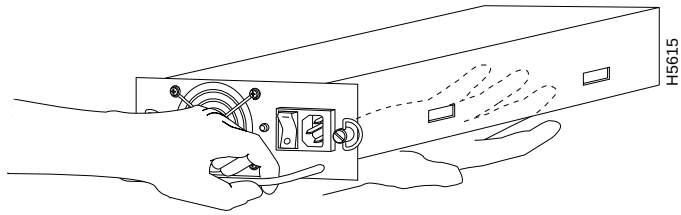
**Step 5** Grasp the AC power supply handle with one hand and slowly pull the power supply out of the chassis toward you. (See Figure 4-4.)

**Figure 4-4 Power Supply Removal and Installation**




**Step 6** While holding the AC power supply handle with one hand, place your other hand underneath to support the bottom of the supply, as shown in Figure 4-5.

**Figure 4-5 Handling an AC Power Supply**




**Step 7** Pull the supply out of the bay and put it aside.

**Step 8** If the power supply bay is to remain empty, install a blank power supply filler plate over the opening and secure it with the mounting screws. This protects the inner chassis from dust and prevents accidental contact with live voltage at the rear of the bay.

## Installing the AC Power Supply

Take the following steps to install an AC power supply:

**Caution** To avoid problems or damage to the switch, *do not* mix DC-input power supplies with AC-input power supplies in individual switches.

**Step 1** Grasp the AC power supply handle with one hand and place your other hand underneath to support the bottom of the supply, as shown in Figure 4-5.

**Step 2** Place the AC power supply into the power supply bay and push the AC power supply into the bay until the power supply faceplate is flush with the cover.

**Step 3** Tighten each of the two captive installation screws by turning them clockwise.

**Caution** Alternate tightening of the captive installation screws, every one or two turns, to avoid skewing the power supply.

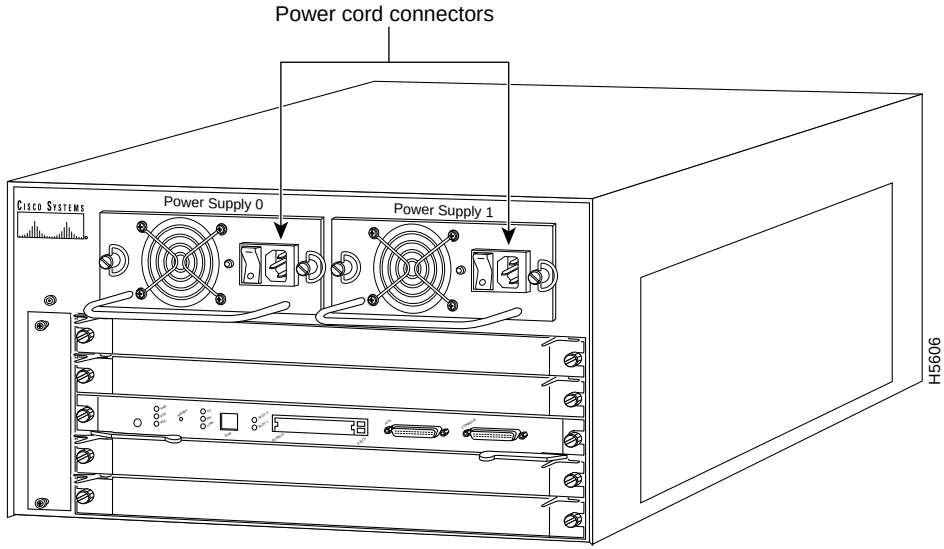
**Caution** Keep hands and fingers out of the power supply bays. Voltage is present on the switch backplane when the system is operating.

## Connecting AC Power

Connect an AC-input power supply as follows:

**Step 1** Plug a power cord into the power inlet of one AC power supply. (See Figure 4-6.)

**Figure 4-6 Power Cord Connections**




**Step 2** Connect the other end of the AC power supply cord to an input line.

To complete the installation, see the section "Powering On the AC Power Supply."

## Connecting Redundant AC Power

Connect the redundant AC power supply to a separate input line. Connect the redundant AC-input power supply as follows:

**Step 1** Plug in the AC power cord on the redundant AC power supply. (See Figure 4-6.)

**Step 2** Connect the redundant AC power supply cord to an input line other than the initial AC power supply line.

### Powering On the AC Power Supply

Perform the following steps to power on the AC-input power supply and confirm the installation:

**Step 1** Turn the power switch of the power supply ON (–).

**Step 2** Verify that the green LED on the power supply front panel is on (see Figure 4-1). This indicates that the power supply is on and is receiving AC source power, providing +5, +12, and +24 VDC to internal components, and showing that all internal voltages are within tolerance.

**Step 3** Verify that the appropriate ATM switch processor PS0 and PS1 LEDs are green. (See Figure 4-2.)

**Step 4** Use the **show environment** command to display the power supply and system status, as shown in this screen example:

```
Switch# show environment
Temperature:                        OK
Fan:                                OK
Voltage:                            OK
Power Supply#0 type: Astec,  status:    OK
Power Supply#1 type: Astec,  status:    OK
Switch#
```

If the LEDs or **show environment** command indicate a power problem or other system problem, refer to the section “Confirming the Installation” in the chapter “Installing the LightStream 1010 ATM Switch Chassis” and Figure 2-11 for troubleshooting information.

## Removing and Installing DC Power Supplies

This section provides removal and installation procedures for DC-input power supplies. The LightStream 1010 ATM switch is configured to your order and is ready for installation and startup when it leaves the factory. As your communication requirements change, you might want to upgrade your system and add or replace a power supply.

The LightStream 1010 ATM switch DC power supplies (DC-input) support redundant hot swapping. When two power supplies are installed, you can install, remove, or replace one of the supplies without affecting system operation. When power is removed from one supply, the redundant power feature causes the second supply to ramp up to full power and

maintain uninterrupted system operation. In systems with dual power supplies, connect each power supply to separate DC-input lines; in the event of a line failure, the second source is still available.

The DC power supply is required by many telcos because their wiring closets are equipped with DC power outlets. From an operational perspective, the DC power supply has the same characteristics as the AC version.

The following caution applies to DC-input power supplies:

**Caution** The LightStream 1010 ATM switch must be installed only in restricted access areas (dedicated equipment rooms, equipment closets, or the like), in accordance with articles 110-16, 110-17 and 110-18 of the National Electrical Code, ANSI/NFPA 70.

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**Note** The installation must comply with all applicable codes. In North America, installation must comply with NEC (ANSI/NFPA 70) and CEC (OArt1, C22.1). Installation is approved for use with copper connectors only. Make the attachment of the chassis ground M4 pamnuts to the central office or other interior ground system with a number 8 AWG copper ground connector as a minimum. The chassis employs two threaded M4x7 chassis ground M4 pamnuts. These pamnuts must connect directly to the central office or other interior ground system, and are located on the front of the chassis. The grounded chassis M4 pamnuts require M4 bolts and locking hardware, which are not included.

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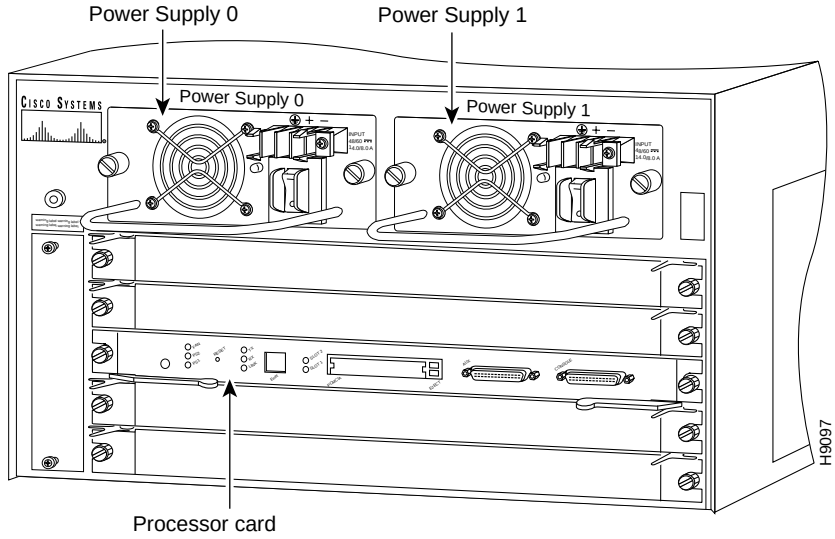
Figure 4-7 shows the location of the DC-input power supplies in a redundant configuration. In a nonredundant configuration, the power supply goes in the slot labeled Power Supply 0.

**Figure 4-7 DC Power Supply Location**




**Caution** Use both hands to remove and install power supplies.

**Caution** Keep hands and fingers out of the power supply bays. Voltage is present on the switch backplane when the system is operating.

**Caution** Always install a filler plate over an empty power supply bay to protect the connectors from contamination.

## Removing the DC Power Supply

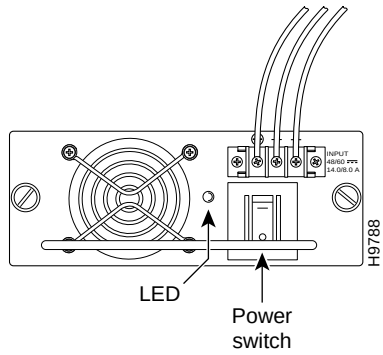
Follow these steps to remove a DC-input power supply:

**Caution** To prevent problems with the switch, *do not* mix DC-input power supplies with AC-input power supplies in individual switches.

**Step 1** Verify that power is off to the DC-input circuit furnishing power to the power supply you are removing.

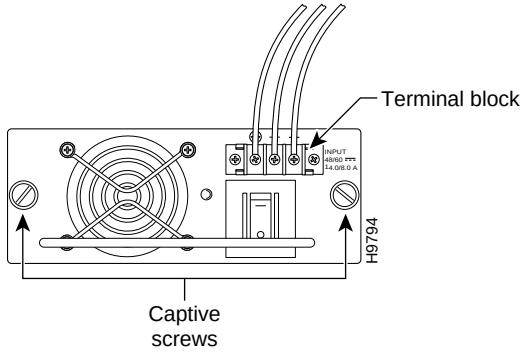
**Step 2** Turn OFF the power switch on the power supply you are removing (see Figure 4-8).

**Figure 4-8 DC Power Supply Power Switch and LED**




**Step 3** Remove the terminal block cover by depressing the two plastic levers on each side of the terminal block (see Figure 4-9).

**Figure 4-9 Terminal Block and Captive Screws**




**Step 4** Disconnect the DC-input wires from the terminal block. (See Figure 4-9.)

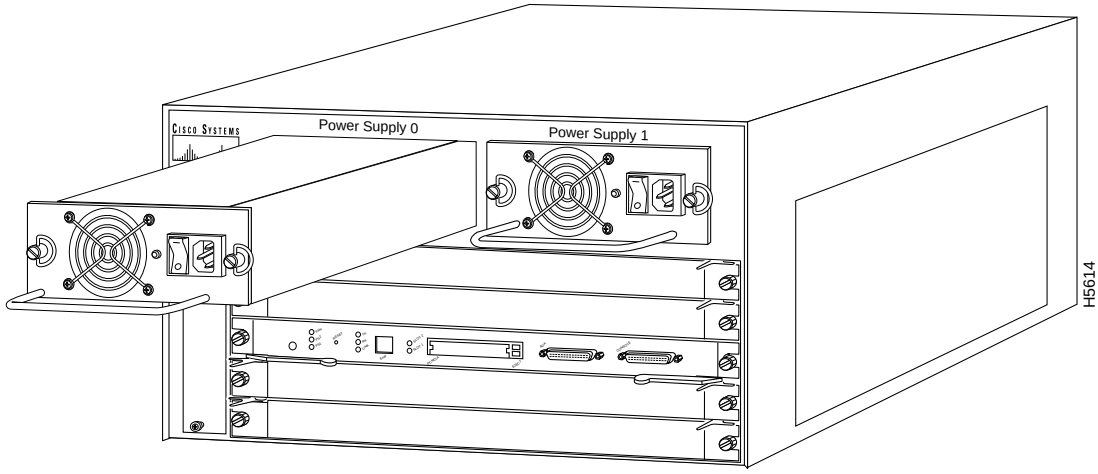
**Caution** Disconnect the ground wire last.

**Step 5** Loosen and remove the captive screws on the sides of the power supply with a screwdriver. (See Figure 4-9.)

**Caution** Alternate loosening the captive installation screws every one or two turns to avoid skewing the power supply.

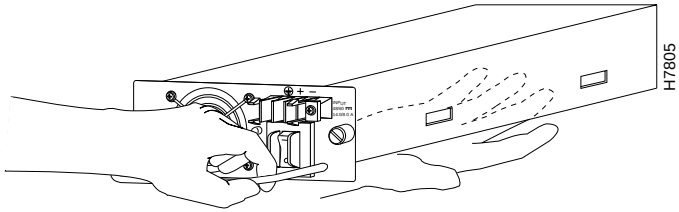
**Step 6** Grasp the DC power supply handle with one hand and slowly pull the power supply out of the chassis toward you. (See Figure 4-10.)

**Figure 4-10 Power Supply Removal and Installation (AC Power Supply Shown)**




**Step 7** While holding the power supply handle with one hand, place your other hand underneath to support the bottom of the supply, as shown in Figure 4-11.

**Figure 4-11 Handling a DC Power Supply**




**Step 8** If the power supply bay is to remain empty, install a blank power supply filler plate over the opening and secure it with the mounting screws. This protects the inner chassis from dust and prevents accidental contact with live voltage at the rear of the bay.

## Installing the DC Power Supply

Take the following steps to install a DC power supply:

**Caution** To avoid problems or damage to the switch, *do not* mix DC-input power supplies with AC-input power supplies in individual switches.

**Step 1** Grasp the DC power supply handle with one hand and place your other hand underneath to support the bottom of the supply, as shown in Figure 4-11.

**Step 2** Place the DC power supply into the power supply bay and push the DC power supply into the bay until the power supply faceplate is flush with the cover.

**Step 3** Tighten each of the two captive installation screws by turning them clockwise (see Figure 4-9).

**Caution** Alternate tightening the captive installation screws every one or two turns to avoid skewing the power supply.

**Caution** Keep hands and fingers out of the power supply bays. Voltage is present on the switch backplane when the system is operating.

After the installation is complete, continue with the following section, “Connecting DC Power.”

## Connecting DC Power

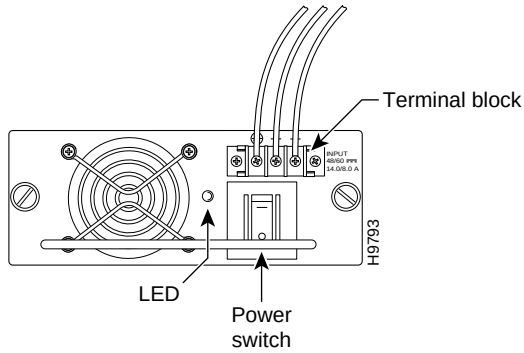
**Warning** Before performing any of the following procedures, ensure that power is removed from the DC circuit. To ensure that all power is OFF, locate the circuit breaker on the panel board that services the DC circuit, switch the circuit breaker to the OFF position, and tape the switch handle of the circuit breaker in the OFF position.

Follow these steps to connect the DC power supply to the DC voltage source:

**Step 1** Verify that power is off to the DC-input circuit.

**Step 2** Ensure that the power switch is OFF (0) on the power supply. (See Figure 4-12.)

**Figure 4-12 Power Switch and Terminal Block Connections**




**Step 3** Remove the terminal block cover by depressing the two plastic levers on each side of the terminal block.

**Step 4** Attach the appropriate lugs to the DC-input wires.

**Step 5** From the top of the terminal block, wire the DC-input power supply to the terminal block as follows. (See Figure 4-12.)

**Caution** Connect the ground wire first.

- Ground wire to ground connector
- Return wire to “+” connector
- Battery wire to “–” connector

**Note** Use 8 AWG copper conductor for the above connections.

**Note** Be sure to route the wires from the top of the terminal block, so that you do not obstruct access to the unit’s power switch.

**Step 6** After ensuring that all wire connections are secure, reinstall the terminal block cover.

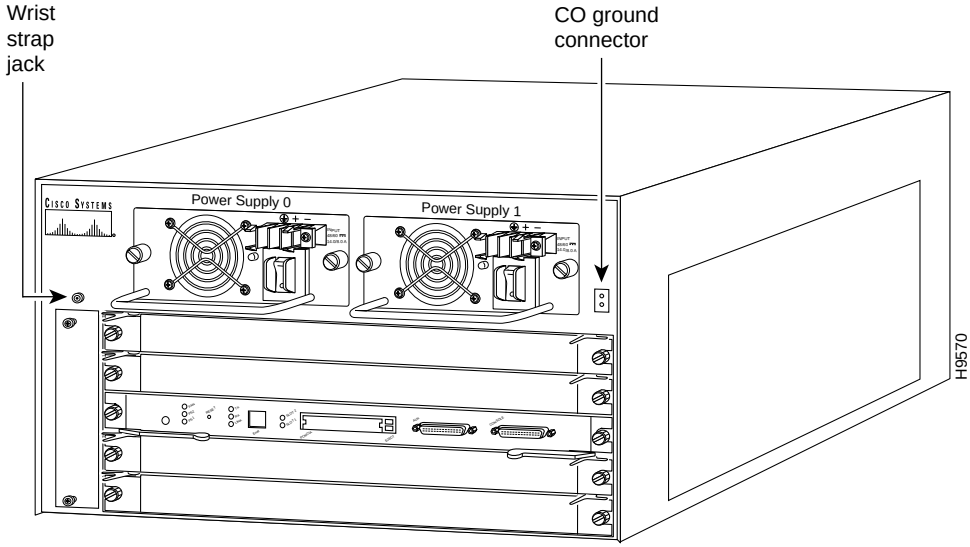
**Step 7** The switch must be connected to the central office (CO) ground through the CO ground connector shown in Figure 4-13.

Use the following guidelines when connecting the switch to CO ground:

- If this is a new installation, remove the adhesive strip covering the CO ground connector on the switch.
- Use a copper ground wire lug and attach it to the switch using two 1/4-inch M4 screws.
- Use an 8 AWG ground wire.

To complete the installation, see the section “Powering On the DC Power Supply” in this chapter.

**Figure 4-13 CO Ground Connector**




## Connecting Redundant DC Power

To connect the redundant DC power supply to a separate input line, repeat the steps in the previous section, "Connecting DC Power," but connect the redundant unit to a different DC-input line than the initial power supply.

## Powering On the DC Power Supply

Perform the following steps to power on the DC power supply and confirm the installation:

**Step 1** Remove the tape from the circuit breaker switch handle, and restore power by moving the handle to the On position.

**Step 2** Connect the redundant DC power supply cord to an input line other than the initial DC power supply line.

**Step 3** Turn the power supply power switch ON (–).

**Step 4** Verify that the green LED on the power supply front panel is on (see Figure 4-8). This indicates that the power supply is on and is receiving DC source power, providing +5, +12, and +24 VDC to internal components, and ensuring that all internal voltages are within tolerance.

**Step 5** Verify that the appropriate ATM switch processor PS0 and PS1 LEDs are on and are green (see Figure 4-2).

**Step 6** Use the **show environment** command to display the power supply and system status, as in the following screen example:

```
Switch# show environment
Temperature:                          OK
Fan:                                  OK
Voltage:                              OK
Power Supply#0 type: Astec,  status:    OK
Power Supply#1 type: Astec,  status:    OK
Switch#
```

If the LEDs or **show environment** command indicate a power problem or other system problem, refer to the section "Confirming the Installation" in the chapter "Installing the LightStream 1010 ATM Switch Chassis" and Figure 2-11 for troubleshooting information.

# Replacing the Chassis Fan Assembly

This section describes how to replace the fan assembly (the chassis fans in a single unit that draw in cooling air and distribute it across the ASP, CMs, and PAMs).

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**Note** Each replaceable component ships with installation instructions. Refer to these instructions for updated procedures and information.

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**Caution** Before performing any procedures in this chapter, review the sections "Safety Recommendations," "Ensuring Safety with Electricity," and "Preventing Electrostatic Discharge Damage" in the chapter "Installing the LightStream 1010 ATM Switch Chassis."

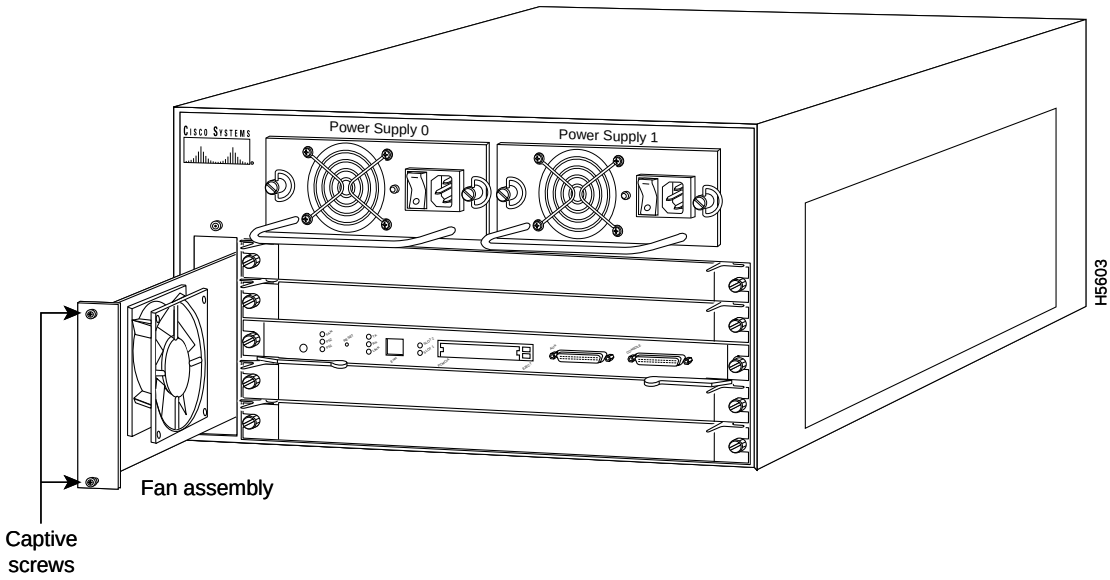
**Caution** If you are replacing the fan assembly while the unit is operating, make sure the replacement fan assembly is ready to be installed immediately.

The chassis fan assembly draws cooling air in through the right side of the chassis and exhausts it through the left side to cool the ASP and PAMs. The absence of cooling air can cause the interior of the chassis to heat up and can cause an overtemperature condition. Never operate the system if the fan assembly is not functioning properly.

The fan assembly is located at the left of the chassis card cage. (See Figure 4-14.) The fan assembly is secured to the back panel with two captive installation screws.

**Caution** Never operate the system if the fan assembly is not functioning properly or if one is not reinstalled quickly. An overtemperature condition can result in severe equipment damage.

**Figure 4-14 Chassis Fan Assembly**



## Tools Required

You need a 3/16-inch flat-blade screwdriver to remove the fan assembly.

## Removing the Fan Assembly

Take the following steps to remove the existing chassis fan assembly:

**Step 1** Locate the fan assembly (Figure 4-14), which is installed to the left of the card cage, under the power supply.

**Step 2** Use a flat-blade screwdriver to loosen each of the two captive installation screws by turning them counterclockwise.

**Step 3** When both screws are loosened, unscrew them from the chassis. These captive installation screws are fixed to the fan assembly; do not attempt to completely remove them.

**Step 4** Grasp the fan assembly with both hands and pull it outward (toward you and away from the backplane) using steady pressure and jogging it until it frees the backplane.

**Step 5** Lift the fan assembly out of the chassis and place it in a safe place.

If the power has not been turned off, quickly proceed to the following section to reinstall a fan assembly.

**Caution** Never operate the system if the fan assembly is not functioning properly or if a fan assembly is not quickly reinstalled. An overtemperature condition can result in severe equipment damage.

## Installing a New Fan Assembly

Take the following steps to install the new fan assembly:

**Step 1** Hold the fan assembly with the two fans facing to the right.

**Step 2** Place the fan assembly into the front chassis cavity so it rests on the floor of the chassis, then lift the fan assembly up slightly and align the top and bottom guides.

**Step 3** Push the fan assembly into the chassis until the screws meet the chassis.

**Step 4** Tighten each of the two captive installation screws.

## Checking the Installation

To verify that the new fan assembly is installed correctly, you should immediately hear it operating. If you do not hear it, turn off the system power and ensure that the fan assembly is completely inserted in the chassis and the faceplate is flush with the switch back panel. If after several attempts the fan assembly does not operate, or if you experience trouble with the installation (for instance, if the captive installation screws do not align with the backplane holes), contact a customer service representative for assistance.